

A NEW *LOMATIUM* (APIACEAE)
FROM THE OCHOCO MOUNTAINS OF CENTRAL OREGON

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ABSTRACT

Lomatium ochocense, a low acaulescent species with a tuberous taproot, is described from the Ochoco Mountains of Crook County, Oregon. The new species differs from the other tuberous *Lomatium* species in its thick, glaucous foliage with broad, overlapping oval to ovate leaflets. This species appears to be a rare local endemic. Habitat differences and phenology of sympatric congeners are discussed.

RESUMEN

Lomatium ochocense, una especie acaulescente con un rizoma tuberoso, se describe las montañas Ochoco del condado de Crook, Oregon. La nueva especie se diferencia de otras especies tuberosas de *Lomatium* por su follaje grueso, glauco con foliolos anchos, de oval a ovados que se solapan. Esta especie parece ser un endemismo local raro. Se discuten las diferencias de hábitat y fenología de congéneres simpátricos.

INTRODUCTION

A new species of *Lomatium* Raf. with decidedly thick glaucous foliage and broad overlapping oval to ovate leaflets was discovered in 1994 on the Ochoco National Forest in the Ochoco Mountains of Crook County in north-central Oregon. The initial site consisted of approximately 200 plants but since then six additional, much larger, populations have been documented on nearby Bureau of Land Management administered land. All known populations are within eleven air kilometers of each other in an isolated area that is difficult to access in early spring when the plants are in flower due to persistent snowdrifts in the canyon bottoms.

Lomatium ochocense Helliwell & Constance ex Helliwell, sp. nov. (**Fig. 1**). TYPE: UNITED STATES, OREGON, Crook Co.: Long Ridge, Ochoco Mountains, T16S, R21E, S11NE1/4, 4540 ft (1360 m), 7 Apr 1995, Richard Helliwell 2313 (HOLOTYPE: UC; ISOTYPES: NY, OSC, UTC, WS).

Herba perennis humilis acaulescens, glabra et glauca, caule subterraneo (pseudoscapo); radix ovoidea-globosa irregulariter, pagina furva; foliis pinnatis, crassis valde, glaucis et caeruleis; foliolis congestis imbricatis; foliolis infimis par saepe remotis; flores citrine.

Low, acaulescent, glabrous and glaucous perennial herbs, 4–8 cm tall, with a prominent pseudoscape 2–6 cm long. Roots irregularly ovoid-globose, 1–3 cm in diameter, black. Leaves usually 2–5 (the outermost usually much reduced), ascending, pinnate, oblong-oval to triangular-ovate, 1–6.5 cm long, 0.6–2.5 cm broad; petioles up to 3 cm long, abruptly and narrowly sheathing basally; leaflets pinnate or pinnatifid, 3 or 5 (–7), overlapping, oblong to ovate, fleshy, glaucous and blue-green, glabrous, lower-most pair often remote and 3 terminal ones ± confluent basally, lobes oblong to ovate, acute to rounded apically. Inflorescence compact compound umbels; peduncles 1–2, 4–6 cm long, spreading horizontally; involucre 0; rays 2–6, unequal, spreading; fertile pedicels 1–6, 5–10 mm long. Umbellets 10–15-flowered; mature pedicels ca 4 mm long; involucre dimidiate; bractlets ca 8, lanceolate to ovate, 2.5–3 mm long, 0.6–1 mm broad. Flowers perfect, andromonoecious; sepals triangular-lanceolate, green, 0.1–0.2 mm long or absent; petals yellow, oval-ovate, abruptly acuminate, 1–2 mm long; stamens maturing unequally, filaments terete, 0.2–1.7 mm long, anthers yellow, turning white, 0.4–0.7 mm long; styles 0.8–1.2 mm long, glabrous, yellowish-green; ovary glabrous, green. Fruit elliptic, 5–8 mm long, 3.5–4.5 mm broad, glabrous; dorsal ribs filiform, lateral ribs narrowly thin-winged, narrower than the body; vitae small, 2–3 in intervals, usually 4 on commissure; seed face nearly plane.

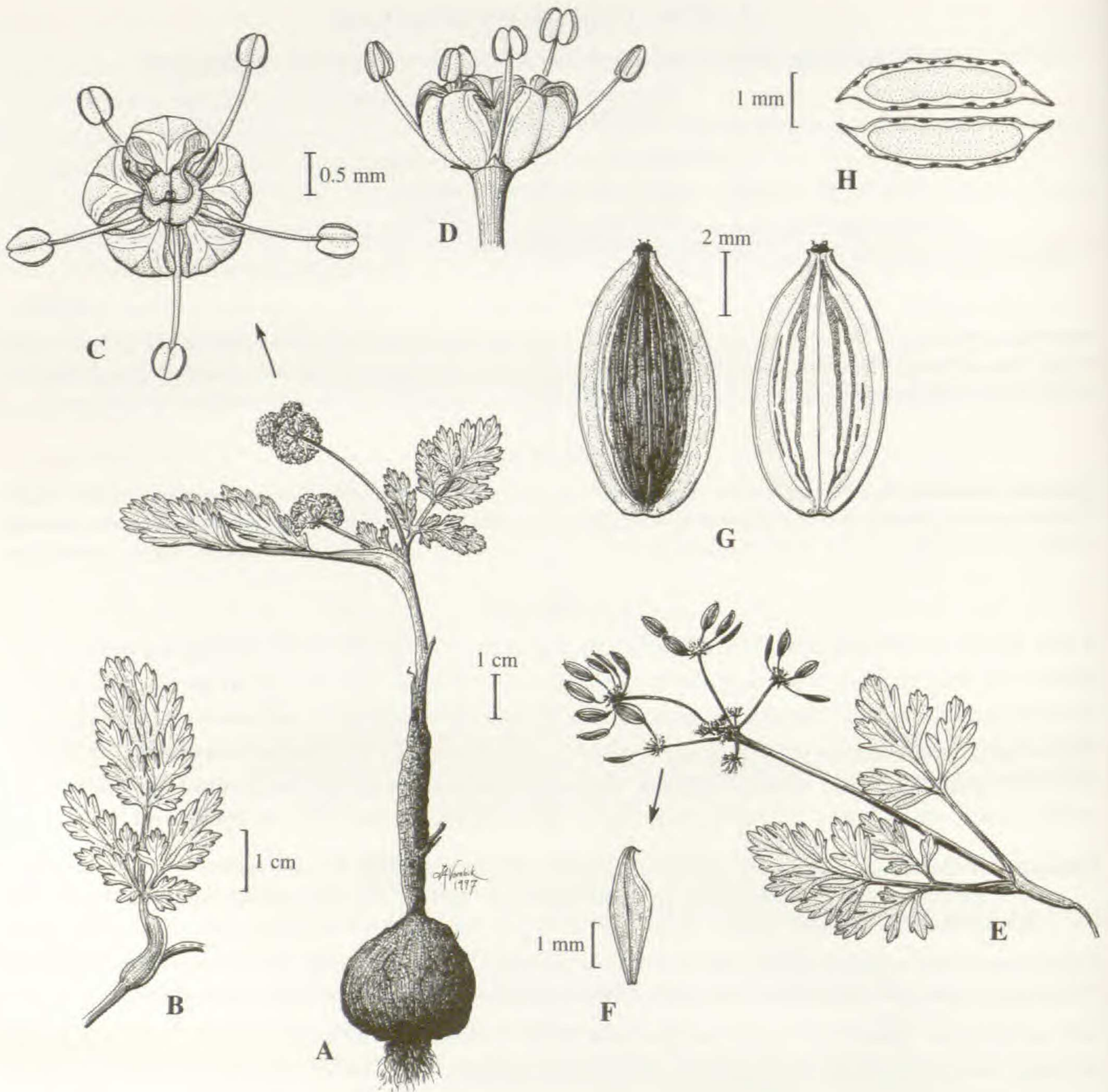


FIG. 1. *Lomatium ochocense*. a. Habit in flower. b. Leaf. c. Perfect flower. d. Staminate flower. e. Habit in fruit. f. Involucel bract. g. Schizocarp (mericarp), dorsal and ventral view. h. Fruit cross-section.

Other specimens seen: **UNITED STATES. OREGON. Crook Co.:** Upper Falls, T15S, R22E, S17, 1350 m, 26 May 94, Helliwell 2304, 2306 (UC).

Relationship.—The massively thickened root of *Lomatium ochocense* clearly places it within the tuberous group of lomatium, an informal group initially recognized by Coulter and Rose (1888), retained by Marcus E. Jones (1908) as sect. *Cous* and most recently monographed by Schlessman (1984). Subsequent genetic work by Soltis and Novak (1997) have determined this group to be polyphyletic having evolved from at least four lineages. Although *L. ochocense* is nearly as diverse genetically as the common *L. cous* (S. Watson) J.M. Coult. & Rose and *L. macrocarpum* (Nutt. ex Torr. & A. Gray) J.M. Coult. & Rose (Gitzendanner & Soltis 2001), its phylogenetic relationships within the genus remain to be determined. Although not monophyletic, this remains a useful artificial group within this large and diverse genus since the tuberous roots

appear to represent a case of parallel evolution in response to the thin, rocky soils and xeric environment that these species share.

Lomatium ochocense is readily distinguishable from congeners by its thick, glaucous, overlapping leaflets that are glaucous blue-green. Among non-tuberous species, superficial similarity to *L. greenmanii* Mathias has been noted. This subalpine endemic of the Wallowa Mountains in northeast Oregon also has pale, glaucous foliage however it is distinctly caulescent, has mostly remote leaflets, and arises from a multicapital, woody caudex.

DISTRIBUTION, ECOLOGY, AND PHENOLOGY

Lomatium ochocense appears to be a restricted endemic. Populations are confined to shallow residual soils on lava tablelands known locally as “scablands”. These scablands are dissected by deep V-shaped canyons that are timbered with *Pinus ponderosa* P. Lawson & C. Lawson and *Pseudotsuga menziesii* (Mirb.) Franco with *Juniperus occidentalis* Hook. abundant along the margins of timber and scattered sporadically across the scabland wherever fracturing in the basalt or lenses of deeper soil allow it. Soils on the scablands are classified as loamy-skeletal, mixed, superactive, frigid Lithic Argixerolls in the Tweener Series <http://www2.ftw.nrcs.usda.gov/osd/dat/T/TWEENER.html>. Bedrock is hard, highly fractured basalt of the Picture Gorge formation of the Columbia River group (Baldwin 1964). *Lomatium ochocense* is restricted to areas where there is exposed bedrock. The climate is characterized by cold moist winters and warm dry summers. Soils are typically saturated through the winter but dry out rapidly by late spring. Elevations of known populations are between 1300 and 1400 m.

Lomatium ochocense occurs in plant communities dominated by *Artemisia rigida* (Nutt.) A. Gray and *Poa secunda* J. Presl. Other associates include *Allium macrum* S. Watson, *Lewisia rediviva* Pursh, *Lomatium cous*, *Lomatium hendersonii* (J.M. Coult. & Rose) J.M. Coult. & Rose, *Lomatium macrocarpum*, *Achnatherum hendersonii* (Vasey) Barkworth, and *Sedum stenopetalum* Pursh. The *Lomatium* species provide the most conspicuous cover across these scablands in early spring with *L. ochocense* flowering from mid-March to late April.

In addition to *Lomatium cous*, *L. hendersonii*, and *L. macrocarpum*, all of which can be found within 20 cm of *L. ochocense*, there are at least eight other species of *Lomatium* in the immediate vicinity. Similar cases of congeners growing together in close proximity have been called “genus communities” (Diver 1936). The ability of similar species to coexist in nearly identical habitats without apparent production of hybrids affords testimony to their reproductive isolation. *Lomatium ochocense*, *L. cous*, and *L. hendersonii* are united by their massive corm-like roots, low acaulescent habit, and yellow flowers but clearly maintain their distinguishing characters in sympatric populations without apparent introgression.

Across these open scablands the *Lomatium* species have segregated themselves by often subtle microsite characteristics. *Lomatium cous* is the most common of the species. It is present on every scabland opening and, together with *L. macrocarpum*, seems to have the least specific habitat requirements. Nevertheless, despite considerable overlap, these two species exhibit significant spatial segregation. In sympatric populations in this area, *L. cous* usually dominates the broad tops of these tablelands while *L. macrocarpum* occupies the gently sloping sides. *Lomatium ochocense* displaces *L. cous* in many areas where there is exposed bedrock in the form of parallel ripples although other areas of apparently identical habitat in the vicinity lack *L. ochocense*. This rock feature appears to be unique to the narrow range of *L. ochocense* and is strikingly evident on aerial photographs. The soil depth where *L. ochocense* occurs is typically 5–9 cm with the root seated in fractures at the bedrock/soil interface. *Lomatium hendersonii* is largely confined to narrow bands of unconsolidated rock called “rock stripes” that commonly lie in parallel formation across the top or side of scablands. In many cases the root is seated in a substrate of loose rock with little or no soil.

Three other *Lomatium* species were observed sharing scabland habitat in the immediate vicinity although they were not intermingled with *L. ochocense*. In slightly deeper or less rocky soil *L. piperi* J.M. Coult. & Rose occurs and in slightly moister areas, particularly those with depressional microrelief, *L. leptocarpum* (Torr. & A. Gray) J.M. Coult. & Rose replaces the other *Lomatium* species. A short-statured ecotype of *L.*

nudicaule (Pursh) J.M. Coult. & Rose is present in slightly deeper soil around the perimeter of the habitat for *L. ochocense*.

Additional *Lomatium* species that were noted in other than scabland habitat in the vicinity include *L. grayi* (J.M. Coult. & Rose) J.M. Coult. & Rose on vertical rock outcrops; *L. dissectum* (Nutt. & Torr. & A. Gray) Mathias & Constance in talus; *L. triternatum* (Pursh) J.M. Coult. & Rose under a timbered canopy; *L. vaginatum* J.M. Coult. & Rose in an inclusion of heavy red soil; and *L. donnellii* (J.M. Coult. & Rose) J.M. Coult. & Rose in deeper, disturbed soils.

The scabland *Lomatium* species are also slightly separated by phenology although all flower early. *Lomatium hendersonii* and *L. piperi* flower by mid-February and perhaps even earlier. *Lomatium cous* appears to slightly precede *L. ochocense* but both were in flower by the second week of March in 1995. *Lomatium macrocarpum* and *L. leptocarpum* began flowering by early April in 1995 leaving only *L. nudicaule* yet to flower. Note that these dates differ significantly from published dates in regional floras (e.g., Cronquist 1961).

It is notable that thickening of the taproot is a consistent feature of the species that are confined to open lithosols. *Lomatium ochocense*, *L. cous*, and *L. hendersonii* all have large irregularly shaped tuberous taproots. *Lomatium piperi* has a globose taproot while *L. leptocarpum* and, to a lesser extent, *L. macrocarpum* both have tuberous thickenings unevenly distributed along their taproot. *Lomatium nudicaule*, which is more commonly found on deeper soils throughout its range, has a stout evenly thickened taproot. The other species have roots that are much less thickened.

Etymology.—For the Ochoco Mountains.

Conservation status.—Although *Lomatium ochocense* appears to be a narrow endemic, the bulk of the known populations lie within a BLM wilderness study area, population sizes are mostly very large, and the potential threats to this species are few. One occurrence is adjacent to a popular recreation area but the rocky nature of the habitat minimizes the potential for adverse impacts from recreationalists. The entire area lies within cattle grazing allotments but the specific areas where *L. ochocense* grow receive insignificant livestock use due to the inherently sparse forage. Several plants were observed to have been browsed, apparently by mule deer that browse the scablands in early spring. Although the species had not yet been validly published, the U.S. Fish and Wildlife Service formally proposed that *L. ochocense* be considered a “species of concern” to ensure its long-term management in August of 2009. Likewise, the plant is considered an “imperiled plant” by the Forest Service (http://www.fs.fed.us/wildflowers/rareplants/profiles/critically_imperiled/lomatium_ochocense/index.shtml), and the name is found on the USDA PLANTS database (<http://plants.usda.gov/java/profile?symbol=LOOC2>).

Comments.—It should be noted that the name *Lomatium ochocense* was first proposed in 1995 soon after the species was discovered. With the assistance of the late Lincoln Constance (1909–2001) a manuscript was prepared and state and federal agencies notified of this rare species. Over the intervening years *L. ochocense* has been the subject of genetic research resulting in the name being published, without description or designation of type, as a *nomen nudum* in Gitzendanner and Soltis (2001). The scientific name proposed by Constance and myself, the detailed description, and the authorship of the name is retained in recognition of Dr. Constance contribution to this effort. However, as he cannot defend the text, I assume responsibility for that.

KEY TO THE TUBEROUS SPECIES OF LOMATIUM IN OREGON

1. Leaves thick, glaucous, blue-green, glabrous; leaflets broadly overlapping, oval-ovate _____ **L. ochocense**
1. Leaves often glabrous but never also thick, glaucous and blue-green, leaflets typically remote except sometimes distally, variously shaped.
 2. Petals white, anthers and stylepodia purple.
 3. Mericarps minutely granular-roughened or bristly, the papillae 0.05 mm long, visible at 15x; acaulescent _____ **L. gormanii**
 3. Mericarps glabrous; sometimes with a reduced cauline leaf.
 4. Longest pedicels (4–)5–15 mm long at maturity; roots globose, up to 5 cm in diameter with a slight kerosene-like odor _____ **L. canbyi**

4. Longest pedicels 0.5–3 mm long at maturity; roots globose, rarely more than 1.5 cm in diameter, odorless _____ **L. piperi**
2. Petal, anthers and stylepodia yellow.
5. Involucel wanting _____ **L. ambiguum**
5. Involucel present.
6. Involucral bractlets fused $\frac{1}{4}$ – $\frac{1}{2}$ their length or sometimes nearly to the apex, usually dimidiate _____ **L. watsonii**
6. Involucral bractlets not fused, sometimes dimidiate
7. Involucral bractlets narrowly to broadly obovate, 0.8–3.2 mm wide; pedicels 1–3 mm long at maturity _____ **L. cous**
7. Involucral bractlets linear to elliptic, up to 1.0 mm wide; pedicels 1–24 mm long at maturity.
8. Cauline leaves present, irregularly pinnately divided; herbage puberulent; Snake River Canyon endemic _____ **L. rollinsii**
8. Plants acaulescent or nearly so, regularly pinnately divided; herbage glabrous; not endemic to the Snake River Canyon.
9. Mericarps linear (6–)9–17 mm long; pedicels short 1–3 mm _____ **L. leptocarpum**
9. Mericarps elliptic to ovate < 9 mm long; pedicels longer, 2.5–24 mm.
10. Roots globose; leaves ternately compound with long, narrow ultimate segments 1–10 cm long and 0.5–3 mm wide _____ **L. hambleniae**
10. Roots not perfectly globose; leaflets not so long and narrow < 2.5 mm.
11. Plants acaulescent; peduncles short at maturity, about 1 dm long and curved to the ground _____ **L. hendersonii**
11. Plants weakly caulescent; peduncles usually more than 1 dm, spreading to erect _____ **L. roseanum**

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